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(Long)

THE RE-ESTABLISHMENT OF A CONSOLIDATED RESEARCH BUREAU OF
AGRICULTURAL ENGINEERING
IN THE U. S. DEPARTMENT OF AGRICULTURE

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THE UNIVERSITY OF CHICAGO

1875

CONFIDENTIAL

To The
Honorable Secretary of Agriculture, Charles F. Brannon, Assistant Secretary
of Agriculture, Knox T. Hutchinson, Agricultural Research Administrator, P. V. Uardon

For more than a decade the American Society of Agricultural Engineers has been concerned by the administrative action which abolished the USDA Bureau of Agricultural Engineering established in 1931 by Congressional enactment and appropriation. The Society has followed the varying fortunes of engineering research as it has been administered as a subordinate group, first in the Bureau of Chemistry and Engineering and subsequently in the Bureau of Plant Industry, Soils and Agricultural Engineering.

It has been apparent that engineering is not entirely compatible with either chemistry or plant industry and soils and that these arrangements were based primarily on administrative expediency. The Society has been reliably informed that when the engineering unit was moved to the Bureau of Plant Industry and Soils it was with the understanding of all concerned that as soon as the engineering group had recovered from its losses during World War II and had attained sufficient stature and maturity it would be re-established as an autonomous research Bureau under the Agricultural Research Administration.

For the past two years the Society has investigated the status of the federal agricultural engineering research organization. It is of the opinion that the conditions for autonomous status have been met and that the best interests of American agriculture and of the United States Department of Agriculture will be served by re-establishing now a consolidated Bureau of Agricultural Engineering. Such a Bureau should encompass all of the agricultural engineering research within the scope of the Department. Formal actions to this effect have been passed in both the executive Council and in the annual business meetings of the Society.

We have the honor of representing the American Society of Agricultural Engineers in presenting this petition for the re-establishment of the Bureau of Agricultural Engineering and in requesting your favorable action in the near future.

ASAE Special Committee
Raymond Olney
J. B. Davidson
Frank J. Zink, Chairman

American Society of Agricultural Engineers
St. Joseph, Michigan
January 15, 1952

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AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS

This petition and presentation of the Special Committee are endorsed by the officers of the Society.

President

Vice President

Secretary-Treasurer

Chairman, Soil and Water Section

Chairman, Farm Electrification Section

Chairman, Farm Buildings Section

Chairman, Farm Power and Machinery Section

PAST PRESIDENTS*

- * All of the living past-presidents of the Society with the exception of the five now employed in the United States Department of Agriculture

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Why a Bureau of Agricultural Engineering is Needed in the
U. S. Department of Agriculture

The U. S. Department of Agriculture is perhaps the largest single factor affecting the economic welfare of the American farmer. In its national and international programs and policies it exerts a leadership for and influence on the agricultural industry which is unparalleled.

The orderly revolution in farm production and marketing practices which has taken place during the past century and which has had a greatly accelerated trend in the past two decades is due very largely to farm mechanization. Farm mechanization is a general term implying the practice of all phases of agricultural engineering. The adoption of farm mechanization practices has now reached the stage where agricultural engineering is rated by vocational educators as one of the five essential techniques in agricultural production. It effects the operation of every farm in the United States. In addition, it is a factor in supplying many of the essential goods and services to the farm and in processing and marketing many of the commodities produced on the farm.

Since agriculture, like American industry, has become so dependent upon the specialized engineering it is obvious that the U. S. Department of Agriculture must recognize to a greater extent its agricultural engineering responsibilities. Many of the Department policies and programs involve engineering to a considerable degree. Adequate engineering competence should be available and made responsible for the formulation and administration of such work.

Research is a basic responsibility of the Department of Agriculture and one essential to its operation programs and policies. It is logical, therefore, that a coordinated engineering unit should be established in the Research Administration on the same administrative level as the other major technologies. Engineering is not a service science which can be broken into small units attached to and administered by other working groups. For its greatest effectiveness and economy it must be an integrated, autonomous unit, administered under competent engineering research leadership and free to cooperate with all of the biological sciences and other groups comprising the Agricultural Research Administration.

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Organization Chart

Present Organization of Department of Agriculture

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The Department of Agriculture is organized into three main branches: the Bureau of Plant Industry, the Bureau of Animal Industry, and the Bureau of Entomology and Plant Quarantine. The Bureau of Plant Industry is responsible for the production and distribution of agricultural products, and the Bureau of Animal Industry is responsible for the production and distribution of animal products. The Bureau of Entomology and Plant Quarantine is responsible for the control of pests and diseases. The Department of Agriculture also has a number of other offices, including the Office of the Secretary, the Office of the Assistant Secretary, and the Office of the Chief of Bureau.

The Department of Agriculture is a federal agency that is responsible for the production and distribution of agricultural products. It is one of the largest and most important agencies in the federal government. The Department of Agriculture has a long history and has played a major role in the development of the United States. It is responsible for the production and distribution of a wide variety of agricultural products, including crops and livestock. The Department of Agriculture also has a number of other responsibilities, including the control of pests and diseases, and the promotion of agricultural research and development.

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Urgent Need for Integrated Agricultural Engineering Research on a Large Scale

1. What is Agricultural Engineering?

Agricultural Engineering is the practice of the physical sciences and engineering arts applicable to the agricultural industry in all of its ramifications.

The primary function of the agricultural engineer is to determine, design, specify and promote the best solutions of the numerous engineering problems peculiar to the agricultural industry. It is his responsibility and objective to aid in developing higher efficiency, greater productive capacity and larger market returns, thus making agriculture more profitable lifting the ~~hard~~ burden of drudgery from agricultural people and raising their standard of living.

Agricultural engineering includes in its scope the engineering aspects of -
Farm safety and methods engineering
Soil and water conservation and use
Farm electrification
Farm ~~power~~ and machinery
Farm structures and rural housing
Conditioning, storing and transporting agricultural commodities
Mechanical processing of agricultural commodities and
rural industries.

Graph --

Comparison of Capital Farm Investments for U.S. and
Selected States.

2. Historical development of Agriculture

American farmers of the Revolutionary period were using methods and equipment very little better than those of Biblical times. Virtually no progress had been made in agricultural production techniques for centuries. Agriculture was essentially a handicraft industry; the farmer was little more than a peasant.

In 1800, it is estimated that 97 percent of the population were on the farm. The one great problem of mankind was still that of getting enough to eat.

During the first half of the nineteenth century inventors were busy on mechanical solutions for augmenting the individual worker's productive capacity and increasing the amount of food needed for a growing population. Although there was the customary lag between the development of a new idea and its widespread use, farm mechanization gradually became a reality.

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The Civil War removed so many workers from farm production that prices were abnormal. At the end of the war, soldiers and others rushed to the fertile plains of the Central West hoping to capitalize on the market demand. Just as they became well established, newer and larger capacity machines were introduced which so increased the farmers productive capacity as to result in a great overproduction of crops. The proportion of the population required for farming was suddenly decreased enormously. The overproduction was so serious that from 1875 to 1897 we had the most serious agricultural depression the country had experienced.

In 1900, _____ percent of the population were on farms. The other _____ percent in the cities provided the man-power for the greatly expanded developments in commerce, industry and the professions.

Early in the twentieth century the farm tractor was introduced and suitable machinery developed for their use together in grain crops. By 1925, after the usual birth pangs of research and trial, the tractor and its specialized equipment had been adapted for tow crops.

In 1925 about 25 percent of the population were on farms;
in 1940, 23 percent.

During the decade from 1940 to 1950 farmers found themselves in a period of drastic changes. Manpower was siphoned from the farms for the military and for industrial needs. Marching men and sweating workers had good ~~apples~~ appetites and increased clothing needs. Many new family units were established during and immediately after the war and during the decade there was a ten million increase in the nation's population.

Cropland acreage had remained about constant for twenty years. During the previous decade, farm population had decreased about 15 percent. Yet those who remained on farms during the 1940's were not only able to produce enough to supply the emergency military needs, the augmented appetites of well-paid industrial workers and the requirements of the increased population; they fed distressed humans in many foreign countries and even produced surpluses. With the help of favorable weather, new production records were set in six of the ten years of the decade.

The explanation of this surprising record involves many considerations. Very favorable weather, high wartime prices for agricultural commodities and patriotism were stimulating factors. Perhaps even more important were the revolutionary technological changes within the agricultural industry - the science of genetics had produced more productive strains of plants and animals, chemistry had provided more potent fertilizers and pesticides, farm management practices had changed to better use of soil and water resources.

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During the war, at the government's request, farmers were urged to produce more food and to conserve the land. The government also provided financial aid to farmers and increased the amount of food needed for the war effort. These were the wartime factors which helped the farmer to produce more food and to conserve the land.

In 1950 it is estimated that 25 percent of the population were on farms. This is a decrease from 25 percent in 1925. The decrease is due to the fact that the population has increased and the number of people working on farms has decreased.

But the most important single item affecting the record was the increased use of productive power and equipment by the farmer. When sons left the farms and the wages of the workers who were left skyrocketed to keep pace with industrial wages, more production tools, were purchased by farm operators. This equipment enabled them to complete more work per hour. To work longer hours, to handle more acres or more livestock and to complete work more promptly when the timing was critical.

Rural electric lines reached 85 percent of the nation's farms bringing close aids and the first of even more specialized farm production tools. Loose housing for early cows and walk-thru milking barns increased the dairyman's productive capacity 30 percent or more.

The fact that during this decade farm production was mechanized to a far greater extent than ever before was a major reason that in 1950 the productive output per individual farm worker had reached its highest point in history - 40 percent greater than that of the pre-war period.

In 1950, 17 percent of the nation's population were on farms.

American agriculture is a highly competitive industry. Farmers compete among themselves, with industry and with foreign producers. It is essential that the American farmer continue to improve his competitive position by producing large volumes of high-quality commodities at low unit costs. As in past years, increasing the productive power and equipment at his disposal and applying engineering management principles are fundamental to his combined economic welfare.

Applying engineering principles to marketing facilities and operations will benefit the agricultural and national economy. The development of well-engineered rural industries will make more job opportunities available to rural people and still further improve our economy.

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Value of manufactured agricultural implements and machines
(1850 - 1950 by 10-year intervals)

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Comparison of Horse and Tractor Numbers in U.S.

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3. Federal Agricultural Engineering Research Concepts and Objectives

Research is an investment; experience has shown that a well-planned and conducted research program will pay dollar dividends.

Research is also insurance; in the words of C. F. Kettering, "research is learning what and how to do when we can't continue what we're doing now".

Farm mechanization developments of the past century have been startling. But the surface has been barely scratched and the opportunities for even greater engineering development and progress.

Agricultural engineering research is becoming increasingly involved and complicated, requiring the fullest use of the physical sciences and engineering analyses. Complete, bi-lateral cooperation between the engineer and biologist or commodity specialist is essential to maximum research productivity.

Public service research is an investment of public funds. By its nature, there is somewhat less urgency for immediate returns than in industrial research; public service research should be more concerned with basic research problems.

The USDA agricultural engineering research should encompass a reasonable balance of basic and applied research problems. Its engineers should not consider themselves finished machine designers. Although some finished designs may result, the most profitable program will be one in which the federal engineer proves a new system, method or arrangement by building an experimental machine and then invites the industrial research engineer to refine and incorporate the new ideas into commercial models. Industry's mass production economics mean that improved machines will be available at reasonable cost. Public service research findings can frequently best be made available to the farmer through the commercial manufacturer.

This liaison of USDA research engineers with state research engineers with biologists and with industry representatives can only be accomplished advantageously by a coordinated USDA engineering unit administered by competent research engineers.

The several phases of agricultural engineering are essential considerations in the development of the agriculture of any country. Several individuals from this profession have and are now helping with the agricultural programs of various countries. As the Point IV program expands an appreciably greater service from agricultural engineering is anticipated. A consolidated Bureau of Agricultural Engineering is the best arrangement for providing a nucleus for this service within the Department.

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Power and Crop Production Per Agricultural Worker
(Foreign countries 6 - U.S. States 5)

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4. Outline History of Agricultural Engineering
Development in the U. S. Department of
Agriculture

- 1890 - Congress established Office of Irrigation inquiry which was continued through 1895.
- 1898 Office of Experiment Stations established a Division of Irrigation Investigations which received the first federal funds appropriated for agricultural engineering research.
- 1901 - Agricultural Engineering first mentioned officially by USDA in annual report of the Secretary, with recommendation that research be initiated in all engineering fields.
- 1907 - Two separate Divisions for Irrigation and Drainage Investigations established in Office of Experiment Stations.
- 1908 - Reports of economic studies and of farm practice relating to farm power, machinery and structures were initiated by Division of Farm Management Investigations, Bureau of Plant Industry. — B9E 7
- 1913 - Engineering investigations in farm power and machinery initiated in Office of Public Roads.
- 1915 - Consolidation of engineering work in irrigation and drainage from OES, that in farm power, machinery and structures from OFMI with that in farm power and machinery in OPR into a Division of Rural Engineering, Office of Public Roads and Rural Engineering.
- 1925 - Division of Agricultural Engineering formed in Bureau of Public Roads.
- 1931 - Bureau of Agricultural Engineering established by Congressional authorization and appropriation.
- 1938 - Engineering research in soil and water transferred to Soil Conservation Service by administrative directive from Secretary of Agriculture.
- 1938 - Bureau of Agricultural Engineering abolished by Secretarial directive and merged with chemistry into the Bureau of Agricultural Chemistry and Engineering.
- 1943 - Agricultural engineering research transferred from BACE to BPISAE by Agricultural Research Administrator.

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5. Current Relationships of A - E Research in USDA

There are two major groups for engineering research in the USDA today. One is the group in BPISAE which includes four major areas of agricultural engineering specialization. The other is the engineering activity included in the SCS research organization.

As mentioned earlier in this presentation the location of agricultural engineering as a subordinate group in BPISAE is presumably a temporary arrangement. The engineering research here has been as well developed as is possible under prevailing circumstances with a program which has met the approval of professional advisory committees, for the past three years. As a minority group in the Bureau, however, perhaps unconscious administrative prejudices have tended to limit the scope of engineering ^{developments} to those projects of interest to the Bureau have failed to ? engineering participation in all projects of the Bureau, where engineering is of importance and have handicapped the development of engineering cooperative relationships with state experiment stations and industry. There is a tendency to consider the engineering work as plant industry engineering. Some well-qualified research engineers have ~~refere~~refused to consider federal appointment because of this lack of professional recognition. A recent Bureau reorganization has eliminated engineering representation at the administrative level.

The engineering research in SCS is presumably integrated with the soils and agronomic research of this organization and coordinated to the requirements of the operations and field technical service of this agency. While this may have been desirable when the agency was first established it does not appear essential today. Rather, for the benefit of long-range research program planning, to more closely coordinate the SCS work with the ARA engineering, soils and agronomic research, to avoid duplication and to further cooperative relationships with the state experiment stations and with industry it is preferable to re-unite the soil and water engineering research with the other agricultural engineering research. This is the universal pattern in the State experiment stations. It was recommended in the Hoover Commission Agricultural Task Force report in which the recommendation for a research unit of "Machines and Structures" has been interpreted by Task Force members as including soil and water conservation structures. Task Force members have further stated that they have no objection to the use of the traditional name "Agricultural Engineering" for this unit, rather than "Machines and Structures."

The present policy of using the BPISAE agricultural engineering research group for the research needs of the Rural Electrification Administration, Farmers Home Administration, Commodity Credit Corporation and Extension Service is commended as providing the best technical information at lowest cost and without duplication. It is recommended that this policy be extended to all other agencies of the Department.

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6. Agricultural Engineering Research Problems Urgently Needing Attention.

Research has been defined earlier as an investment in economic welfare and as an ~~investment~~ insurance in maintaining that welfare.

Agriculture like any other industry in our free enterprise depends upon the profit motive for its welfare and stability. Furthermore, and again like other industry, the economic health of the entire industry - and of our nation - depends upon the combined economic status of each individual included in the industry or nation.

The individual farmers annual profit and loss statement depends upon the calculation of a simple formula:

$$\text{Profit} = (\text{Selling price} - \text{cost price}) \text{ quantity.}$$

The quantity of produce which a farmer has to market depends very largely upon his use of machinery and equipment.

The cost per unit of commodity is also largely determined by the productive tools which he uses to augment his labor.

The selling price is very often influenced to a great extent by the condition and quality of the commodity and the time and place of the sale. All of the factors may be varied according to the farmers use of storage, conditioning and processing and transporting equipment and market facilities.

It is obvious, therefore, that engineering plays a major part in the economic welfare of the individual farmer, and hence that of both the agricultural and national economics. Agricultural Engineering research is urgently needed to balance the other research efforts of the Department.

Past Productivity of Agricultural Engineering Research

It is well to judge the future by the past. Future contributions to be expected from federal agricultural engineering research can best be judged by those which have been ~~ms~~ made in the past - and made under administrative conditions which cannot be considered as entirely favorable or stimulating. The following quotation from a recent issue of the USDA Employees Bulletin summarizes some of the agricultural engineering research contributions:

"The role of engineers played as consultants for the Commodity Credit Corporation in the purchase of more than a hundred million dollars worth of grain-storage buildings, bins, and equipment since 1948; the plans and specifications they developed, at a cost of 4 percent of the amount of the loan program, for low-cost farm housing; the development of a seed-cotton drier now used in more than 5,000 gins, which has added 20 million dollars annually to the income of cotton growers; the development of a lint-flue cleaner now used in some 1,500 gins, which has added some 5 million dollars annually to growers' income; tests of tractor

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tires at the U. S. Tillage Laboratory, Auburn, may bring a saving of 10 percent annually in fuel costs for tractor operations; improved machinery for seeding sugar beets which has reduced seeding rates from 20 to less than 4 pounds per acre and labor by one-third, accounting for \$250,000 annual savings in seed and 7 million dollars in labor; improvements in curing methods and equipment for bright leaf tobacco, reducing costs by 50 percent, a potential saving of 10 million dollars annually.

Current Agricultural Engineering Research Appropriations

The record of engineering research productivity indicated above is especially significant in view of the relatively modest research fund allocations which have been made to the engineering work.

The record for 1950 shows a total of _____ appropriated to federal agencies. Of this sum, _____ or approximately _____ percent, was allocated to the agricultural engineering group in BPISAE.

It would seem that the past record of engineering research productivity, the farmers investment in engineering goods and services, and the importance of engineering in the farmers operation and economic position warrant a significantly greater position of USDA research funds allocated to engineering work.

Agricultural Engineering Research Problems

Soil and Water. There are many engineering problems in this field for which accurate and sufficient answers have not been found. There are still many problems of land reclamation and soil erosion in almost every agricultural region. Engineering on the farm to help prevent floods, to assist in the economic development of the various river basins, to prevent the depletion of our ground water resources, to make supplementary irrigation economically feasible in humid areas are essential activities for government research agencies.

Farm Power and Machinery - New farms of petroleum fields, improved wheel traction new forms of tillage equipment, field equipment to aid in prevention of soil erosion losses, precision planting equipment for many crops, insect and weed control equipment, improved fertilizer distribution equipment, more efficient harvesting equipment, specialized dispensing equipment for agricultural airplanes and many other problems in this field require the attention of research agricultural engineers.

Farm Electrification. Much of the research in this field over the past two or three decades has been devoted to the more obvious applications of electricity to reduce farm labor and to make farm living more comfortable. To a lesser extent, attention has been given to utilizing the peculiar characteristics of electricity and the special machines for developing the different manifestations of electrical energy to better farm practice. An enlarged program of engineering research in this field is urgently needed.

Farm Structures and Rural Housing. Federal engineering research has pioneered

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Farm Structures and Rural Housing. Federal engineering research has pioneered IN several aspects of the determination of the physical environment on the biological response of agricultural commodities and livestock. In one area, grain conditioning and storage, the results of the agricultural engineering research are being used to excellent economic advantage in the government-sponsored storage programs. Increased attention to building materials and construction practices, building arrangement, materials handling equipment and structural designs and more attractive and better arranged low-cost farm houses are all problems requiring engineering attention.

Conditioning, storing, transporting and marketing. Relatively little engineering consideration has been given to the facilities for these important off-farm activities, although they may exert a very large influence in the selling price for agricultural commodities. In one field alone, livestock marketing, the losses due to preventable bruising and crippling occasioned largely by inadequate physical facilities total millions of dollars each year.

Mechanical processing and rural industries. As farm population^s decrease, engineering research can provide new jobs for rural people in mechanical processing plants for agricultural commodities and in rural industries. Excellent results are being achieved in the engineering work on fiber processing. Many other commodities can be processed to advantage in rural communities. Food engineering, the development of plants and equipment for relatively small-scale food industries for rural areas is an especially attractive opportunity for engineering research.

Farm safety and methods engineering. The advent of more intricate farm machinery has increased the ever-present hazards of farm operation. Fire is a constant menace. Methods engineering studies to simplify farm work, to reduce the high energy requirements of some jobs, to even peak labor requirement and to integrate the size and capacity of farm machines and buildings with the scale of farm enterprises are in their infancy. All three fields promise attractive opportunities for federal agricultural engineering research. All are problems which daily confront the farm operation.

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Average Man-Hours of Labor Required for the
Production of Various Crops

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Average Man-Hour Requirements for Producing and
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What is Involved in this Action

If it is agreed that the importance of agricultural engineering to the farmer, to the U. S. Department of Agriculture and if Agricultural Research Administration is essentially as great as has been outlined in this presentation, it is obvious that concrete action should be taken to implement the suggestion that a Bureau of Agricultural Engineering be re-established.

It should be understood that the term "Bureau" is used simply to identify a separate operating unit under the Agricultural Research Administration as it is now constituted. Any other unit designation, which is applied to the research units for animal industry, plant industry and soils, human nutrition and home economics, etc. and which indicates the same administrative level for engineering as these other units is satisfactory. It is essential, however, that the unit be identified as "Agricultural Engineering" to properly identify it professionally and to indicate its scope of activity.

Administrative Action. Administrative directives separated and abolished the earlier Bureau of Agricultural Engineering, placed the segments under Soil Conservation Service and Bureau of Chemistry and later moved one portion from Chemistry to Plant Industry and Soils. Similar directives have made more far reaching changes in the Department of Agriculture and other federal Departments. Another directive can re-establish a consolidated Bureau of Agricultural Engineering.

It is urged that this action be taken now in order that the advantages of this administrative organization may be put into effect immediately. If the Department of Agriculture as a whole is subsequently reorganized it is doubtful that the Department reorganization plan will react down to the level of of Research Bureau. If the names of the research units should later be changed from "Bureau" to some other designation, this can readily be accomplished without disturbing the working relationships of the engineering group.

There is no apparent reason for believing that consolidating the engineering research into a separate organization will materially affect the administrative, budget and research programs of the agencies to which they are now attached.

Bureau of Agricultural Engineering Organization. It is believed that establishing a consolidated engineering research unit can be effected without major difficulty or increased administrative cost.

Personnel - The individual selected to head the new Bureau of Agricultural Engineering must be a capable administrator who has been trained and has had productive experience in the field of agricultural engineering research. He should be known nationally in the profession. The petitioning ASAE Special Committee is willing to name two or more individuals meeting these qualifications.

No other major personnel changes in the technical or business service groups of the present organization will be necessary.

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Facilities. The present office and laboratory facilities of the agricultural engineering group in EPISAE should be adequate for housing the combined Bureau for the present. As new research programs are inaugurated some specialized laboratories will need to be provided. Eventually it is hoped that a suitable agricultural engineering office and laboratory building can be erected at the Agricultural Research Center.

Appropriations. No additional federal expenditures will be required to effect the re-establishment of a consolidated Bureau of Agricultural Engineering.

It is hoped that additional allocations of the research funds now appropriated for USDA research can be directed to agricultural engineering to implement some of the very desirable and urgent engineering research programs previously discussed. Within the foreseeable future it is believed that appropriations for the various divisions of engineering research might realistically be about as follows:

Division of	
Soil and water engineering	\$500,000
Farm <u>power and</u> machinery	600,000
Farm structures and rural housing	400,000
Farm electrification	400,000
Conditioning, storing, trans- porting, marketing	150,000
Mechanical Processing & Rural Industries	500,000
Farm safety and methods engineering	150,000
	\$ 2,700,000

This total is approximately 50 percent more than is currently being devoted to engineering research in the two agencies. It will amount to about $5\frac{1}{2}$ percent of the total research appropriations now being expended by federal agencies.

It should be repeated that it is believed this added amount can be allocated to engineering research from present appropriations without increasing federal expenditures.

SUMMARY

The U. S. Department of Agriculture is not recognizing the ~~most~~ important role which agricultural engineering plays in agriculture today.

Mechanized farming, in all of its engineering implications, is the basis of much of the development in farm practice and economic improvement which has been experienced in the United States over the past century. The trend to further mechanization has been especially marked during the past decade.

Research has been the foundation for most of the changes which have taken place. It is the factual background for many of the Department policies and programs. It is logical, therefore, that the Department should re-establish now a consolidated Bureau of Agricultural Engineering in its Research Administration, the consolidation to re-unite the engineering research now in the Soil Conservation Service and that administered as a subordinate group in the Bureau of Plant Industry, Soils and Agricultural Engineering.

The advantages to be gained by this administrative change are:

1. Prevention of overlapping and duplicating of engineering research.
2. The autonomy for the development of a better balance and wider scope of engineering research.
3. Separate identity to eliminate administrative isolation, to better cooperation with all federal research agencies and to provide technical engineering consultation and data to all Department action agencies.
4. Improved cooperative relationships with state agricultural colleges. (The agricultural experiment stations of 45 states, Alaska, Puerto Rico and Hawaii have agricultural engineering departments or sections on the same administrative level - the other major technologies serving agriculture. One state has a "Department of Mechanized Agriculture; one has combined Agricultural Engineering with Agronomy and Economics; and the third has combined agricultural engineering with other engineering.)
5. Improved cooperative relationships with industries providing essential goods and services to agriculture.
6. Better organization and facilities for providing coordinated technical assistance to the Point IV program.
7. Professional identity to assist in affecting more agricultural engineers of proven research ability to federal service.

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This total is approximately 50 percent more than is currently being devoted to engineering research in the two agencies. It will amount to about 25 percent of the total research appropriations now being expended by Federal agencies.

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The re-establishment of a Bureau of Agricultural Engineering can be effected without major administrative or personnel difficulties. It can be accomplished within the present federal research appropriations.

It is recommended that the scope of engineering research be enlarged to include other urgent research projects by allocating to engineering additional funds from those now appropriated to the Department for research.

It is urged that the administrative directives to re-establish a consolidated Bureau of Agricultural Engineering be issued now. If the Department of Agriculture is to be reorganized at some future date the status of the various research units will not be materially affected. There is no apparent reason for delaying further the economies, efficiency and greater productivity to be gained by consolidating engineering research into a separate research unit.

The U.S. Department of Agriculture cannot properly meet its obligations to the American farmer and to the agricultural industry as a whole without recognizing the increasing importance of farm mechanization and the Agricultural Engineering Research essential to this trend.

The re-establishment of a consolidated Bureau of Agricultural Engineering in the USDA Agricultural Research Administration is the first essential to this recognition.

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